

Assignment 10.1**Questions 4, 10, 12, 29 – 39 odd, 32**

4) Yes, elements with high atomic numbers have more electrons, and therefore greater London dispersion forces. Given enough electrons, they can be stronger than hydrogen bonds. Elements like Iodine, have so many they are solids at room temp.

10) Intra-molecular forces are much stronger than inter-molecular. When heated to a certain temperature, all compounds will eventually vaporize when they break free of their inter-molecular forces. However, this is not enough energy to break free of their intra-molecular bonds.

12) $C_{25}H_{52}$ has the greater London dispersion forces because it has the higher melting point. Because it is so large, its London dispersion forces are greater than water's hydrogen bonds.

29)a. London dispersion force only

b. dipole-dipole + some LDF

c. hydrogen bonding + weak LDF

d. ionic bonding

e. London dispersion force only

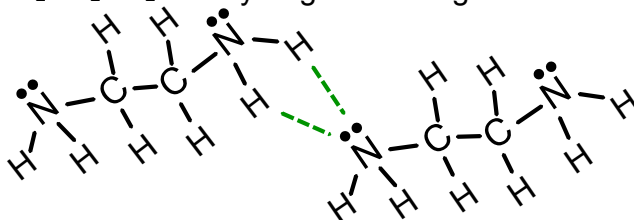
f. dipole-dipole force

g. ionic bonding

31)a. OCS - the bonding is the same, but O is more electronegative than S, so it will have dipole-dipole forces. It also has more electrons, so it will have stronger London dispersion forces.

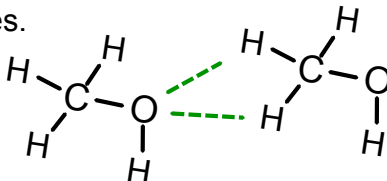
b. SeO_2 - there is a slightly greater difference in electronegativities, so it will have stronger dipole moments and because Se has more electrons than S, it will have stronger London dispersion forces.

c. $H_2NCH_2CH_2NH_2$ has hydrogen bonding at both ends, not just one.



d. H_2CO - it has polar bonds whereas CH_3CH_3 is nonpolar.

e. CH_3OH - it has hydrogen bonds which are stronger than H_2CO 's dipole-dipole forces.

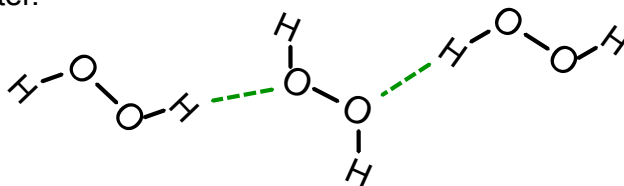


- 33) a. neopentane has less surface area than n-pentane, so it will have weaker London dispersion forces, thus a lower boiling point.
- b. HF exhibits hydrogen bonding which is stronger than the dipole-dipole forces between HCl molecules.
- c. LiCl is an ionic compound. Ionic bonds are much stronger intermolecular forces than dipole-dipole forces.
- d. n-hexane is a bigger molecule with more electrons, so it has greater London dispersion forces, thus a higher boiling point.

- 35) a. HBr - has dipole-dipole forces
- b. NaCl - has ionic bonds
- c. I₂ - greater London dispersion forces
- d. N₂ - is nonpolar and has weaker London dispersion forces than CO₂.
Note: CO has even fewer LD forces, but it is polar.
- e. CH₄ - All are nonpolar, but CH₄ has fewer LD forces.
- f. HF - has hydrogen bonding, so the boiling point is higher
- g. CH₃CH₂CH₂OH - has hydrogen bonding.

- 37) Water has greater intermolecular forces with the glass than with other water molecules. Mercury has greater intermolecular forces with other mercury atoms than with the glass.

- 39) H₂O₂ has two places for hydrogen bonds to form compared to one for water.



- 32) F₂ - Only F₂ and Cl₂ are close because they are nonpolar. F₂ is the closest because it has a similar number of electrons to Ar, so it has similar London dispersion forces.